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ON THE IDENTITY AND DISTRIBUTION OF THE IRISH RAT, *MUS HIBERNICUS*, THOMPSON.

By Wm. Eagle Clarke & Gerald E. H. Barrett-Hamilton.

Some amount of uncertainty, or of misapprehension, appears to have always enshrouded the Rat described by Wm. Thompson (Proc. Zool. Soc. 1837, pp. 52, 53), as the Irish Rat, *Mus hibernicus*. The present contribution gives the results of investigations undertaken with a view to the solution of this little problem.

From Thompson's time to the year 1888 no practical attention appears to have been paid to this animal by zoologists; at least, no information based upon an examination of specimens has, we believe, been contributed to a further knowledge of it. On the other hand, the several naturalists who have had occasion to refer to *M. hiberuicus* have ventured opinions as regards its identity which are irreconcilable with the facts.

In the course of this enquiry we have examined no less than fifty-six specimens, of which forty were received in the flesh. As the result of this investigation, based as it is upon an ample supply of material, we are able to declare, without qualification, our conviction that *Mus hibernicus* is a melanistic form of *Mus decumanus*. Though only common in Ireland, less so in the Outer Hebrides, and apparently unknown elsewhere in Britain, there is no reason for regarding it as a distinct species.* For

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* De Selys Longchamps, in the Appendix to his 'Etudes de Micromammalologie' (1839), states that, if the colour of the fur is constant, and if

MUSEUM

the sake convenience, we shall allude to it as *Mus hibernicus* in this communication.

We cannot understand why *Mus hibernicus* has been confounded or associated with *Mus rattus*. In no respect does it possess any of the characters of that species, which it can only be said to resemble in colour. It has also been thought to be a hybrid between *Mus decumanus* and *Mus rattus*, while Mr. T. Southwell, of Norwich (Trans. Norfolk and Norwich Nat. Hist. Soc. ii. pp. 419—421; Zool. 1889, pp. 321—323), has suggested that certain rats, which he was inclined to regard as examples of *Mus hibernicus*, were hybrids between *Mus decumanus* and *Mus alexandrinus*. We can only say, with respect to these opinions, that *not one* of the fifty-six examples of *Mus hibernicus* which have been examined by us was found to possess, in the smallest degree, any of the peculiar characters of either *Mus rattus* or *Mus alexandrinus*. All the specimens of *Mus hibernicus* which have come under our notice have been characterised by the possession of (1) a tail decidedly shorter than the head and body, (2) comparatively small ears, and (3) cranial characters agreeing entirely with those of *Mus decumanus*.

Where, then, are the peculiarities which have caused this form to be associated with *Mus rattus* and *Mus alexandrinus*. Both these species have (1) the tail decidedly longer than the head and body, (2) the ears comparatively large, considerably larger than in *M. decumanus*, and (3) the cranial peculiarities markedly different from those of *M. decumanus*. If *M. hibernicus* is related to either of these forms, should it not be the possessor, to a greater or lesser degree, of some of their important and characteristic peculiarities? Yet it has absolutely none of them.

Thompson's original description of *Mus hibernicus* is an accurate one; but it is necessary to add that the examination of a much larger series of specimens than came under his observation makes it certain that the white patch on the breast is possessed only by a comparatively small number of individuals; of the fifty-six specimens we have received thirteen only possessed this peculiarity. Thompson undoubtedly attached much im-

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the difference in the length of the ears between *Mus hibernicus* and *Mus rattus* is not due to the way in which the type-specimen has been prepared, he should be inclined to admit it as a species.

portance to this white breast-spot; but it is needless to say that, beyond being an interesting fact, this peculiarity possesses no real value.

This patch of white is borne upon the breast and between the fore limbs. It varies much in size and shape, and is mostly unsymmetrical, being more developed to the right or left of the median line of the breast, as the case may be. In some it takes the form of a narrow stripe extending backwards towards the abdomen, and is an inch or more in length. In others it is a spot, or a somewhat triangular and irregularly shaped patch. One specimen examined in April, 1890, had three spots on the breast and between the fore-legs arranged thus:—O O O. But, as above remarked, beyond being an interesting fact, this peculiarity possesses no specific value; on the other hand, similarly marked examples of *M. decumanus* are unknown to us, though we have come across some curiously marked specimens of that species, in which the head and legs were flecked with white. As Messrs. Thompson's and Eagle Clarke's descriptions have already been reproduced in 'The Zoologist' (1889, pp. 201—206), it is not thought necessary to repeat or modify them here.

The following tabulation gives the dimensions of several individuals selected to show the variation to which mature specimens of *Mus hibernicus* are subject:—

	♂	♂	♂	♀	♀	♀
	In.	In.	In.	In.	In.	In.
Length of head and body	8·4	9·5	10·0	8·25	9·0	10·20
,, head	2·0	2·3	2·6	2·0	2·15	2·2
,, tail	7·4	7·7	7·10	7·7	6·1	8·5
,, ears	0·75	0·9	1·1	0·75	0·9	0·9
,, fore-feet and claw ...	0·8	0·85	1·0	0·75	0·8	0·8
,, hind-feet and claw...	1·6	1·8	1·9	1·7	1·58	1·75

The heaviest male weighed 17½ oz. The largest female, a splendid specimen, had been gutted before it was received, and hence no weight could be taken.

Regarding the cranial characters, we find that there are two well-marked types of skull represented in our British rats. The most conspicuous difference between these types lies in the interparietal, parietal, and squamosal bones, and the zygomatic arches. To put it in a general way, in *Mus rattus* and *Mus* *alexandrinus* the cranium is broad and arched; while in *Mus decumanus* and *Mus hibernicus* the cranium is straight and depressed.

These differences are well and accurately shown in the accompanying figures (p. 5), for which we are much indebted to the skilful pencil of our friend Mr. Herbert Goodchild, of Edinburgh.

The characters of these two types of cranium are expressed and compared in the following tabulated form:—

	Mus rattus and Mus alexandrinus.	Mus decumanus and Mus hibernicus.
Interparietals.	For difference of shape, see Figure	For difference in shape, see Figure.
Parietals	Convex; broad between the lateral ridges	Flat; narrow between the lateral ridges, which are closer to each other than in *Mus rattus* and *Mus alexandrinus*.
Squamosals	The anterior temporal margins of these bones, and the anterior margins of the parietals, are in the same line	The anterior temporal margins are considerably in advance of the anterior margins of the parietals.
Zygomata		More expanded than in *Mus rattus* and *Mus alexandrinus*.
Nasal region	Tapers somewhat conspicuously, as compared with *Mus decumanus* and *Mus hibernicus*.	

It is perhaps not improbable that *Mus decumanus* and *Mus hibernicus* interbreed, but we have no evidence that such is the case; nor can the fact that parti-coloured specimens appear, so far as we have been able to ascertain, to be most uncommon, be urged fn proof that such unions do not take place. That evidence of such a nature is perhaps not to be expected, we may refer to the experiments of J. von Fischer (Zool. Garten, 1869, p. 341), who attempted to breed a variegated form of *M. musculus* by pairing grey with white specimens, but without success, the young always being either uniform grey or uniform white. M. De L'Isle's elaborate experiments on the inter-breeding of *Mus rattus* and *Mus alexandrinus* (Ann. Sci. Nat. iv., Zoologie) also prove that parti-coloured specimens are of extreme rarity.

We know, however, of one parti-coloured rat,* but whether it was the offspring of a cross between *Mus decumanus* and *Mus hibernicus* it is impossible to say. In this specimen, which was trapped at Kilmanock, the predominating colour was brown, with the shoulders and tail black, while a black line extended the whole length of and along the median line of the back. To add to its singular appearance the head was marked with white.

In two nests of young rats which were found in the winter of 1889–90 it is interesting to note that all the young were black. One of these nests contained five young. The haunts frequented by *M. hibernicus* are precisely similar to those of its brown brother. We have had specimens from dwelling-houses, from the upper storey of a granary, from the banks of a pond, and from rabbits' burrows.

FIG 1. FIG 2

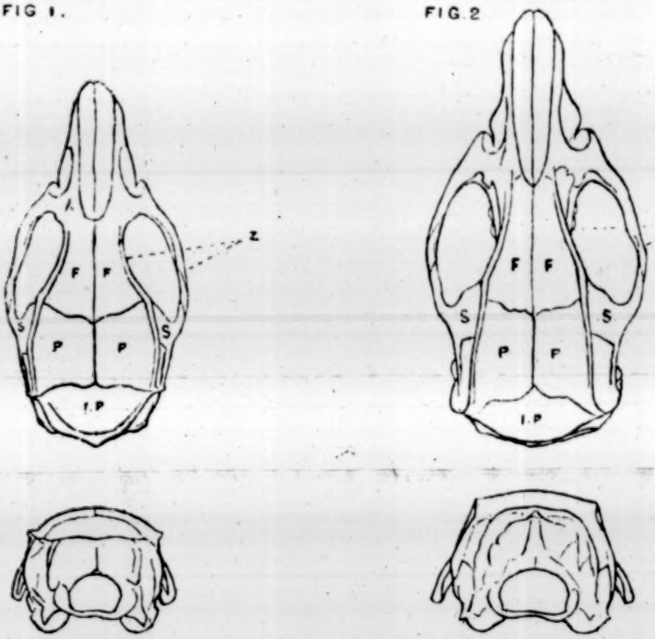

Fig. 1. Skull of *Mus rattus* and *M. alexandrinus*. Fig. 2. Skull of *Mus decumanus* and *M. hibernicus*. Seen from above and from behind. F = Frontals. P = Parietals. I-P = Interparietals. S = Squamosals. Z = Zygomata.

No difference has been detected in the habits of the two forms. They are frequently found in the same hole; and young of both kinds have been seen playing together. Mr. Gibbon, who sent us specimens from the Saltee Islands, off the Wexford coast, remarks that they live there with the Brown Rats, and do not appear to interfere with each other.

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* Described in 'The Zoologist' for 1889, p. 142.

Perhaps the most interesting, as well as the most singular, feature in the history of *Mus hibernicus* is its peculiar and limited geographical distribution. It is not rare, and is very widely distributed in Ireland. Out of that country, the only known localities for Britain in which it occurs are in the Outer Hebrides, where it has long been known to the inhabitants, and whence we have examined three specimens. It would appear to be quite unknown on the mainland of Britain, where all our endeavours to procure specimens have failed, though we should certainly not be surprised to find that a melanism of so common a creature as the Brown Rat should now and then occur. It seems certain, however, that such varieties are very far from common. On the Continent of Europe the only instance of the occurrence of black varieties of *Mus decumanus* known to us is the one recorded by A. Milne-Edwards(Ann. Sci. Nat. 1871, xv. art. 7) for Paris, where, in 1871, it had been known for twenty years in the Menagerie of the Museum, and is described as abundant and increasing in numbers.

The somewhat common and general occurrence of this melanic form in the circumscribed areas indicated should, it is thought, afford some help towards the solution of the interesting, but as yet unexplained, phenomenon of melanism. In this connection, it may not be considered out of place to allude to another melanic form, Sabine's Snipe, which has occurred in Ireland, we believe, much more frequently than elsewhere; thus out of about thirty recorded examples, one appears as a continental specimen, one is from Scotland, about ten from England, while no less than about eighteen are credited to Ireland.

Considerable trouble has been taken to investigate the distribution of *Mus hibernicus* in Ireland, and communications have been received on the subject from almost every county. Further investigation is, however, still needed. This we hope to undertake, and, should it prove successful, it may form the subject of a future communication. Though a careful record has been kept of all the localities from which positive evidence of the existence of these Black Rats has been received, it has been thought that the whole list would be too long for insertion here in its entirety, and that a condensed summary would be sufficient. Negative evidence has been considered of little value, as it is thought that the presence of *Mus hibernicus* in a district or locality has been frequently overlooked. Indeed, both positive and negative evidence has sometimes been received from the same locality.

Positive evidence (in some cases of more or less doubtful value) has been received of the presence of Black Rats in seventeen Irish counties. These, with the exception of the Queen's County, are all situated on or near the coast, but chiefly on the eastern side of the island. Some reputed localities are, however, in the extreme west: thus all Ireland, except the most central parts, is included in the list of localities. It has been found that those counties (such as Armagh, Antrim, and Wexford) which have been most closely examined, have produced the most successful results, although they are situated in widely separated parts of Ireland. It is our belief that, when all Ireland has been as carefully examined, *Mus hibernicus* will be found to exist in varying abundance, though, perhaps, locally, all over the island. The localities from which specimens have been received, either by Thompson or by ourselves, are twenty in number, and are distributed over the following counties:—Antrim (2), Armagh (2), Carlow (2), Dublin (2), Kilkenny (1), and Wexford (11). These counties all lie on the east coast of Ireland, and were an attempt made to estimate the distribution of *Mus hibernicus* from them alone, we should have to conclude that the animal is confined to the extreme east. Yet an examination of the evidence received from the west coast (which is unfortunately of too great length to be given here) shows that its presence the there is at all events extremely probable. It is likely that head-quarters of the Black Rat in Ireland are now in Carlow, in one part of which (Fenagh) it is said even to equal the Brown Rat in numbers. But its abundance appears to vary very considerably in different localities, and even in the same locality at different times. Thus at Ballyhyland (Wexford) it was common in 1872, after which it became scarce, and disappeared altogether after 1878, from which date no Black Rats were observed until August, 1889, when a specimen was trapped and forwarded to us by Mr. C. B. Moffat. At Fenagh (Carlow), on the contrary, it is said that Black Rats "seem to have increased much lately.' In our opinion *Mus hibernicus** is not decreasing in Ireland, as a whole, though it is possible that in single localities it may sometimes become extinct or lost sight of. Wherever it has *once* occurred, *there*, we think, it will probably always be found, though, as has been shown, its numbers may vary considerably.

The following note, by the Rev. P. A. Keatinge, of Athlone, appeared in 'The Field' in 1883. It gives a very good account of a peculiar and, as yet, unexplained phenomenon in the history of the Irish Black Rat:—

> "BLACK RAT IN CO. WEXFORD.—During a short visit to Co. Wexford, early last October, I was informed that a large colony of Black Rats had suddenly put in an appearance in that county.† I repaired with a friend to the locality, with no small degree of curiosity. We quietly entered a field of oaten stubble, in which some stacks of corn were yet standing. About fifteen yards from these stacks ran a dyke separating the field from the adjoining farm. In this dyke, which was regularly honeycombed with them, the strange visitors had taken up their abode. In less than an hour I counted over forty of them running out and in from burrow to stubble. Where they came from so suddenly, and in such numbers, is a mystery to me, as I have been intimately acquainted with the place for over thirty years, and a Black Rat was never heard of in the locality; in fact, the country folk viewed them with serious apprehension of some pending calamity. I secured two with the gun, and am having the skins dressed for a tobacco-pouch, as the fur is remarkably soft and silky."

We cannot, at present, offer any explanation of the above phenomenon; but we may state that similar occurrences have been reported from other localities.

In conclusion, we must offer our hearty thanks to all those whose names are mentioned as having assisted us in this enquiry, as well as to many others who have taken considerable trouble to help us, and whose names are too numerous to mention. We must therefore content ourselves with expressing our obligation to them collectively.

It is hoped that this paper will stimulate Irish naturalists to study such an interesting, yet neglected, creature as *Mus hibernicus*. We shall always be most happy to receive communications, or to answer any questions which may be put to us, on the subject.

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* Owing to a confusion with *Mus rattus*, *Mus hibernicus* is often described as a decreasing species in Ireland.

† In the parish of Dennistown.

The following is a list of the localities from which specimens have been received, with the names of those who have kindly procured them:—

ANTRIM.—Coggrey Mills and Carrickfergus (Thompson).

ARMAGH.—Loughgall; Mr. E. Williams. Tynan Abbey; Messrs. R. L. Patterson and R. L. Praeger.

CARLOW.—Fenagh; Mr. D. R. Pack Beresford. Borris; Mr. A. A. May.

DUBLIN.—Dame Street; Mr. E. Williams. A specimen labelled "Dublin" is in the Museum of Science and Art: donor, Mr. J. S. Trevor.

KILKENNY.—Waterford; Mr. Fennessy. Ferrybank; Dr. R. J. Burkitt.

WEXFORD.—Alderton; Miss L. S. Glascott. Arthurstown; G. E. H. B.-H. Ballyhyland; Mr. C. B. Moffat. Cahore; Mr. W. Potter. Dennistown; Rev. P. A. Keatinge. Kilmanock; G. E. H. B.-H. New Ross; Mr. A. Shanahan. Rosegarland; G. E. H. B.-H. Rosslare; Mr. E. A. Gibbon. Saltee Island (Lesser); Mr. E. A. Gibbon. Stokestown; Mr. C. F. Dean Drake.

WILDFOWLING IN THE ESTUARY OF THE MOY.

BY ROBERT WARREN.

WIGEON appeared here this season in much larger numbers than usual, and at least a month earlier than the regular time for the main flight to arrive in the Estuary. A few generally show themselves in September (probably birds bred in Scotland); but it is not until the middle or end of November, most frequently the latter time, that the great body of Wigeon arrive in this locality. Last season very few were seen until the last week in November, when the great flight appeared; while this year large numbers arrived by the 20th October, and I think by the 28th all the Wigeon had arrived for the season.

Golden Plover arrived in very large numbers, more so than for some years past. A very large stand of 500 or 600 birds frequented the banks of the Sligo side of the Estuary, a part of the sands they had deserted for several years past; while on the Moy side the stands of Golden Plover haunting the Moyne and Bartragh sands were larger than I have observed there for many years. From other parts of the country I have had similar accounts of the unusually large number of both Lapwings and

Golden Plover met with. Snipe also are said to be more numerous than usual this season.

A few notes of my first two days' punt-shooting this season may interest some of your readers, as showing the variety of birds met with, as well as some of the successes and disappointments of the wildfowl shooter, and the hardships that have occasionally to be undergone.

On the 28th October I launched my punt, and having got everything on board, I pushed off from the shore for Bartragh, and observing some birds about half-a-mile away, I took them to be Mergansers, from seeing some of them diving; however, on approaching nearer, the Mergansers made off, leaving twenty ducks behind them, which my glass showed to be Pintails. These swam into the bank, some walking up on it, and began pluming themselves, while others remained in the water, but all so scattered and far asunder that they offered no prospect of a good shot when within range. I had no choice but to fire at those nearest, and knocked over five birds, but secured only four, an old female and two young ones, and a young male just showing a few grey feathers on the thighs. My shot disturbed a large number of Lapwings and a large stand of 500 or 600 Golden Plover, and these after a time pitched far in on the sand-bank, quite out of shot from the water. Seeing there was no chance of getting at the Plover, I continued my way down the channel to Bartragh. When turning round a bend of the channel I saw from behind a point of sand a number of heads stretched up watching, and on getting a little nearer, I found they were a lot of Mergansers (about fifty), resting after their morning's fishing; some were on the bank, while others were in the water, playing about, the old males chasing each other, and performing all sorts of odd-looking antics, such as only Mergansers can go on with. Not caring to fire at such worthless birds, I passed on to the stony flat on the Scurmore side of the channel, where I saw about 150 Wigeon feeding amongst the stones. On hearing some Curlew screaming an alarm, they all rose and pitched in the water outside the flat, but shortly after returned to feed, scattering in all directions so widely over the flats that they offered such a poor mark for a shot that, when I brought up the punt and fired at those nearest, I knocked down only eight birds. Four of these so effectually hid themselves in the long sea-weed on the stones before I landed that I was unable to find them, and had to content myself with only four birds as the produce of my shot. Having loaded, and feeling very much disgusted at my poor luck, I landed at Bartragh to wait for the turn of the tide to return. While thus waiting, I observed that a large company of Wigeon had come in from the bay, and were swimming into the bank before the "Big Rock," so, dressing the punt with wrack, I paddled down to them, easily getting within shot of about a dozen that were feeding along the shore, but unfortunately there was a short sea knocked up by the flood-tide, which caused the punt to be so unsteady that I fired over them as she was raised by a sea just as I pulled the trigger, and the consequence was that I only got a brace of Wigeon.

Thus unsuccessful with the Wigeon, I returned up channel with the flood-tide, intending to try my luck with the Plover when the rising tide would crowd them upon the bank, and float the punt within shot. On reaching the bank where the Plover were, I found that they were far out of shot on the highest part of the bank, while a large number of Lapwings were resting along the edge of it, some standing in the water, but all too scattered to be worth firing at; and for half-an-hour I waited, paddling nearly all round the bank, trying from various positions to find the Lapwings well placed for a shot. Several times I was on the point of firing, but waited in the hope of their crowding nearer together; at the same time the Golden Plover were very restless, frequently shifting their ground, but still never crossing near the edge of the bank, and in the end, long before the bank was covered, they and the Lapwings left the sands for the fields, without my obtaining a shot, although I had waited so long.

On the 30th I went out again, my destination being the Moyne channel and Killala pool, and as that part of the Estuary was seldom disturbed, I expected to get some shots if the birds were there. On my way down the channel to Bartragh I observed the large stand of Golden Plover and a very large number of Lapwings flying about, waiting for the banks to uncover, and also several bunches of Wigeon, but none within shot; so in order to save the tide for crossing the flats between Bartragh and Moyne, I hurried on, not waiting to try for the Wigeon. In the upper part of the Moyne channel I saw a dozen of Wigeon (but did not get a shot, for they were too scattered), and an immense flock of Curlew and Godwits; and further down the channel opposite the

Abbey, about a dozen Wigeon were resting on the side of the bank; they were very unsuspicious, and, letting me come up within shot, I killed four of them dead. The report of the gun disturbed the Golden Plover on the Bartragh sands, and two very large stands were soon circling overhead, but did not come within shot, but again pitched on the bank far out of range. After loading I went further down the channel, and near the ballast-heaps I found four Wigeon feeding between the heaps; but although I got within forty yards, and waited for some time, I did not fire, because I was never able to get the four together, and did not think it worth firing at a pair. A short distance down I saw a few more, but, like the others, they kept too scattered; so I passed them, and then saw a Red-throated Diver and a pair of Sclavonian Grebes diving in the channel. I followed the latter birds for some time, trying to get both together for a shot; but unfortunately whenever I brought up the punt within shot, they always separated, swimming far asunder, though keeping close together when out of range. I followed them with the same bad luck until I got opposite the Sand-eel Bank, and there, on the other side of the channel, I saw fifteen or twenty feeding along the edge of the water, and, paddling on to them, I found them very wild, not allowing me to get within shot; so turning the punt, I was just going again after the Grebes, when I saw a number of Wigeon resting on the point of sand in the pool below the Sand-eel Bank, and until then concealed from view by the bend of the channel; so at once, leaving the Grebes, I crossed over, paddling down to them, but found that, owing to some birds in the water, I was unable to fire at the thickest part of the flock, but was obliged to take those next me, knocking down seventeen birds, but securing only fifteen; two cripples escaped by hiding in the bent-grass on the sand-hills.

The wind then rising with the flowing tide, I turned for home, having a very hard pull of five miles before me against a head-wind, and although I had a chance of a very good shot at a large flock of Godwits, I was unable to take it, owing to the rough water. When passing the point of Goose Island I disturbed a Purple Sandpiper, but could not attempt to shoot it, for it was all I could do to make way against the rising wind and high seas, and, by the time I landed, was pretty well tired out; for working a punt with a a small blade-paddle agianst a head-wind is much more fatiguing than rowing with a pair of ordinary sculls.

ON THE HERPETOLOGY OF THE GRAND DUCHY OF BADEN.

By G. Norman Douglass.

This part of Germany is now quite familiar to Englishmen, and it will suffice, for the purpose of these introductory remarks, briefly to glance over its physical features, to the influence of which its exceptional variety of organic life is in great measure due. The Black Forest, forming the back-bone of the country, comprises—within a limited area—considerable diversity of aspect; thus the Southern and Western Slopes, skirting the Rhine valley, are reckoned amongst the warmest parts of Germany, while, as we ascend its inclines, we find ourselves in districts of an almost Alpine character or on exposed table-lands, such as that constituting the watershed of the Danube and the rivers flowing westwards.

The surface of this region is similarly more diversified than its name might lead us to suppose, and the extensive fir forests, relieved here and there by rocky eminences or stretches of moorland and lakes, and intersected by numberless rivulets, are most productive in variety of specific forms. This circumstance strikes the observer more readily than their actual individual abundance, and can be explained by the fact that many strictly lowland forms, following up the sheltered valleys, are found in surroundings no longer adapted to their habits and occupied already by other, often allied or representative, species.

The more monotonous Rhine valley contrasts unfavourably in point of natural scenery with the mountainous tracts, though this portion of the country equally is not devoid of attractions for the naturalist, as it supports some highly interesting types of animal life. An almost continuous and luxuriant growth of wood, interspersed by small sheets of water in connection with the Rhine, covers the humid soil on both banks of that river, and it is much to be regretted that both here, as elsewhere, the relentless advance of civilization, under various disguises, has perceptibly reduced the numbers of several species, and threatens eventually to exterminate entire orders.

Between the above-mentioned belt of vegetation and the Schwarzwald proper, its northern less elevated prolongations, and a portion of the Odenwald in the extreme north, is situated the alluvial Rhine plain, containing the most populous and highly cultivated districts.

As regards the geological constitution of the Grand Duchy, which has attracted the attention of several eminent writers, little need here be said, as its effects, direct or indirect, upon the organisms distributed over the surface, are easily over-rated, and indeed, in the case of the higher animals, almost *nil.* It will therefore be sufficient to notice that the more hilly portions of the country are composed chiefly of gneiss and granite, with occasional porphyritic formations superimposed, and that among sedimentary rocks the Trias predominates, being represented by large beds of Bunter sandstone (identical with that of the Vosges) and Muschelkalk; while of particular interest, as affecting also in some degree the distribution of certain species, may be mentioned:—the re-appearance of the oolite as a continuation of the Swiss Jura, pierced by the Danube in its upper course; the occurrence of pleistocene Loess or fluviatile loam, in portions of the Rhine valley; some noteworthy tertiary deposits in the South-east; and, lastly, the elevations of phonolite, dolerite, and other volcanic material of the Höhgau (north of Schaffhausen), the Kaiserstuhl (between Freiburg and the Rhine), and one or two isolated points.

Such contrasts of temperature and marked diversity of surface and soil may justly be expected to favour the preservation of the rarer indigenous species, while the geographical position of the country has afforded the necessary facilities for the immigration, from various points and by various sources, of foreign ones; and it is to the influence of these factors that we may attribute the richness, in almost all its branches, of the native organic world.

Referring exclusively to reptiles and amphibians, we find that Baden lays claim to nearly all the German species of the former now recognised, one Chelonian and one Ophidian only being absent from the list. Whereas in this instance we have reason to apprehend that the number may never be augmented, there is some prospect that of the two anurous batrachians, with the presence of which this country is as yet not credited, one or the other may still be discovered. Of tailed batrachians only one sub-alpine form can be cited, to which it is not entitled.

Yet, notwithstanding these apparent inducements, the number of those who have published observations on this branch of Natural History is relatively insignificant, even when compared with that of their collaborators of the neighbouring provinces; so much so, that the author who first, in 1883, sketched a brief outline of the entire native Fauna, is able to enumerate only two previous papers as dealing with these classes. In the two pages devoted to Herpetology of the treatise above referred to, an accurate, though not very detailed, account of the habitat of each species, so far as was then possible, is given; but since that time the study of this science has progressed with rapid strides, and, as is usually the case, some of the most valuable contributions to a general knowledge are found scattered throughout various works.

The following notes—founded mostly on observations which terminated with the earlier half of 1889—may perhaps induce others visiting this part of Germany to take up the same subject, and I may here premise that much still remains to be cleared up, as there is an astounding dearth of information respecting, for instance, the range of some of the more nocturnal and restricted batrachia, whose economy can be investigated successfully only at certain seasons of the year, as well as of those species which have only of late been added to the Fauna of Europe.

I have refrained from entering into descriptions of typical forms such as will be found in all systematic works, but have ventured to discuss more fully some of the phenomena of coloration, in the hope that this enquiry may merit the notice of other observers who have hitherto confined their remarks to the more descriptive side of the subject.

Reptilia.—Order I. Chelonia.

1. *Emys lutaria*, Mars.—Any specimens obtained in the Grand Duchy within recent times have doubtless not been of wild origin, and it may be added that equally little importance can be attached to the accounts of its occurrence in other parts of South Germany, such as in the neighbourhood of Kreuznach and various parts in Bavaria, &c.,—reports which have generally been founded on the capture of single individuals, escaped or purposely liberated. In Switzerland, also, its occurrence in a wild condition seems very doubtful, though F. v. Tschudi notes the capture of several in the valley of the Reuss, "which did

not appear to be specimens that had escaped": others, from the Rhone valley, Lake of Geneva, and elsewhere, are now considered to have been introduced (Fatio). Not so in Northern Germany, where this species is found in Mecklenburg, Brandenburg, Posen, Eastern Prussia; further, in Courland,—though not in Livonia,[*] —and even as far as the vicinities of Moscow.

Hence we may suppose that its hardy constitution would have been proof against all the climatal vicissitudes of the regions (Upper and Lower Austria, South Germany, North and Central France) situated between the above-mentioned northern limits and the Mediterranean countries, Dalmatia, Italy, South France, to which it is again indigenous. Fossiliferous remains testify to its former more extended and connected range; and its present apparent extirpation in the intervening territorial zone referred to may be attributed in some degree to an extreme structural inflexibility.

Order II. Sauria.—I. Fam. Lacertidæ.

1. *Lacerta viridis*, Laur.—The range of this lizard is restricted in Baden to apparently two points, one of which, the Isteiner Klotz,—a hill lying between Freiburg and Bâle, and near the Rhine,—is frequently referred to. It appears to be rarer there now than formerly.[†] The other locality is the Kaiserstuhl already mentioned, where it is found in considerable numbers, affecting chiefly the central portions and the warm slope towards the Rhine (in greatest abundance on the so-called "Badberg," and near the ruined castle of Limburg), whilst, so far as my experience goes, it avoids the southern and eastern districts, where its place is iccupied by a particularly fine race of *L. agilis*.

Specimens from here often attain 30 to 35 centimètres in length, and are usually of the *punctata*, Daud., variety, the female retaining more of the green ground-colour. The young of both sexes, at first characterized by a uniform brownish tint, generally assume with advancing years a tendency to *maculata*, Dugès,—Fatio's var. "tachée ou marbrée,—which develops later into the *punctata* of the adults, this process being carried furthest in the male. Sometimes this tendency fails to assert itself, in which case the adults are of the bright green colour,—var. *concolor*, Dugès,—common, it appears, with German specimens from other localities, though I have found this form scarce on the Kaiserstuhl. Both the young and adult females often exhibit traces of the *bilineata*, Daud.

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[*] See O. v. Lewis, 'Reptilien Kur-Liv-und Esthlands.' 1884.

[†] F. Müller, 'Verhandlungen der Naturforsch. Gesellschaft zu Basel.'

The immigration of this species into the country has evidently taken place by way of the Jura and Bâle, and its present sporadic distribution throughout South Germany can be ascribed to its well-known sensibility to cold and damp, and has not resulted from a supposed predilection for any particular soil. The Kaiserstuhl is covered to a large extent with the alluvial Loess, and I have been informed of the occurrence of *L. viridis* on tracts of this and loamy ground in other districts; but it appears highly probable that the Sand Lizard, which thrives exceptionally well on this soil, has been the cause of these statements. Prof. Leydig observed that *L. agilis* preferred the Keuper to the Muschelkalk, and in the Northern Palatinate the Wall Lizard is often conspicuous by its absence on metamorphic rocks, while abundant everywhere on the red sandstone; still, in spite of this and other negative evidence, I should hesitate in imputing any importance to this factor in the case of *L. viridis*.

Its distribution in other parts of Germany is now pretty accurately determined. It is found chiefly along the Rhine (at Bingen, Rüdesheim, St. Goar, Loreley, &c.), and its western tributaries, the Nahe and Moselle; as also on the Danube near the point where it enters Austria. In the Haardt mountains of the Bavarian Palatinate, where an excellent authority (Dr. Noll) reports its occurrence, I have failed to detect any traces, nor have I been more successful in the course of my excursions into other parts of that country, and must certainly agree with Medicus* as to its extreme rarity there. Through the kindness of Mr. Basserman, of Deidesheim, I received a fine male *punctata* from that locality, which settles the question formerly raised as to its occurrence at this—again apparently isolated—point. He informs me that it is found in some numbers at two places near the town,—the "Königsbacher Wald" and the "Waldberg."

Several writers testify to the existence of this species near

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* 'Thiere der Rheinpfalz,' 1867.

Worms; hence I must consider my not meeting with it there as accidental: at Oberstein, on the river Nahe, celebrated for its agate industry, it was likewise not to be seen. This latter fact may help to support Mr. Geisen-Heyner's* supposition that it does not ascend the river beyond Münster.

The *L. viridis* of the Kaiserstuhl, though frequently of a bluish tinge about the head and neck, is not of the true "*mento-cærulea*" (Bonap.) variety, as it is found in parts of the Tyrol, Italy, &c. With typical individuals of this variety the lateral and anterior portions of the head, as well as the lower jaw, are often of a vivid green colour, whereas with specimens from the Kaiserstuhl it is precisely these parts which display the most intense blue, the throat itself being seldom thus marked. It may therefore be assumed that the latter are tending to attain this feature characteristic of the true *mento-cærulea*, though as yet they have not arrived at its typical development; and I should regard the green colour above referred to as the latest modification in this line of ornamentation, thus, that the blue has gradually concentrated itself on the throat, and that the head, by way of additional contrast, has re-assumed the original green colour.

Similar instances, illustrating a sort of reciprocal convertibility of the colours blue and green, when employed for mere "decorative" purposes, are exhibited by some forms of *L. muralis* —compare var. *cæruleo-ocellata: viridi-ocellata*—and other reptiles; sometimes the blue seems to have the priority, acquiring only by degrees an iridescent greenish lustre, which in its turn may become so permanent as to efface the original blue; in other cases the latter colour appears of more recent origin. It is noticeable that the same colours alternate in an analogous manner with some birds.

Even comparatively young individuals from the Kaiserstuhl are thus marked, a circumstance which no doubt favours the transmission of this character from the male to the female. There seems to be no difficulty in assuming such a transmission to have taken place, in view of the fact that many secondary sexual characters peculiar to the one are often inherited by both sexes, and more readily if they occur at an early age; and in the instance of colour, which is most easily modified and transmitted, many ornaments confined to the male tend to reappear in the female, sometimes with the curious phenomenon of a greater or less change in tint, consequent doubtless on physiological causes. The *mento-cærulea* variety is certainly a local fashion, so to speak, and it deserves notice that the distinguishing blue patch on the throat is in many localities of the most ephemeral nature; in others it is retained long after the honeymoon, and in some again the lizards are perpetually thus coloured.* Finally, this feature is not rarely confined to the male, but elsewhere equally conspicuous in both sexes (see de Bedriaga, 'Beitrage zur Kenntnis der Lacertidenfamilie,' p. 67).

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* 'Wirbeltierfauna von Kreuznach,' 1888.

Hence the unstable character of these periodical variations in colour does not preclude the possibility of their becoming fixed under certain conditions, and it may conversely be urged that many now permanent tints may have been at a former period more or less short lived.

In this category can be placed the blue of the Faraglione Lizard and other analogous varieties, to which I hope to recur later, merely noting here that the throat of the male is again the most brilliantly coloured portion of the body, that of the female being much less vivid; but in neither case does the blue appearance of the lizards entirely vanish during the summer and autumn, whereas the blue tinge occasionally suffused over the body of the common Wall Lizard is most volatile.

L. vivipara and *agilis* offer similar examples of blue colouring, during the pairing season, on the throat and lower surfaces, some Russian forms of the latter having, according to Bedriaga, a mark on the throat analogous to that of *L. viridis mento-cærulea*.

As the intensity of brilliant colours is generally considered to diminish if light be excluded, the behaviour of some specimens of *L. agilis*, which I had occasion to forward a day's journey to Prof. Leydig, may be worthy of notice to illustrate that the reverse sometimes takes place. He writes:—"On opening the box several of the males were of a light green, almost phosphorescent, colouring all over (including the head and extremities), which soon, however, disappeared on their being set in a terrarium, and gave place to the usual green colour." He connects this with a similar change in the colour of *L. viridis* recorded by Vallisnieri, and referred to in Prof. Leydig's work on the German Saurians, p. 166. Other instances of a like nature —due in all cases to the action of the chromatophores—have been observed with the Batrachia, and with the m all variations of colour, whether seasonal or otherwise, are more rapidly produced and effaced.*

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* In parts of Southern Italy I was surprised to find that *L. viridis* exhibited, even in the height of spring, no signs of blue colouring about the head; whilst with others captured near Lake Como the blue was hardly diminished in intensity even in autumn. (The Dalmatian *viridis*—var. *major*, Boul.—is entirely devoid of this peculiarity.)

The term local, as applied to many forms of this species, is a little misleading, only a few being characteristic of distinct localities, though they certainly do not all occur promiscuously. Passing the whole series of varieties in review, we find that the main types change as we proceed from west to east; in the former the ocellated, in the latter the longitudinally striated varieties are more prevalent.

On the Kaiserstuhl, *L. viridis* was pairing about the middle of April or later, the males in slight numerical preponderance, and I have found the eggs as early as the latter part of June, once or twice under stones, a fact which perhaps indicates (as others have already observed) that the female had carried them there for safety.

The "voice" of *L. viridis* consists in a hissing or rasping sound, which appears to be by no means common to all individuals, and I noticed that the few of this species and of *L. agilis* which possessed this peculiarity were males. The power of emitting sounds appears more general with the *viridis* of Trieste (Prof. Landois, cited by Eimer): according to the last-named naturalist, *L. muralis cærulea* is equally capable of producing them.

In the instances which have come under my notice an examination failed to reveal any catarrhal symptoms, such as those which seem to affect some individuals of *L. muralis* when subject to sudden changes of climate. A pathological condition similar to this last is described by J. J. Tschudi in the case of *L. agilis*, but with this notable difference, that here the lizards were found in this state, and infected two others with which they were afterwards confined.

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* Leydig, 'Uber das Blau,' &c., 1889.

NOTES ON THE BIRDS OF LEICESTERSHIRE.

By F. B. Whitlock.

As the whole of my life has been spent either in Leicestershire itself, or immediately on its borders, in the neighbouring county of Notts, it was with feelings of no small interest that I commenced the perusal of Mr. Browne's work on the 'Vertebrate Fauna of Leicester and Rutland.' My special subject is Ornithology, and, though I possess some knowledge of the other Vertebrates of Leicestershire, I leave the criticism of the remaining portions of Mr. Browne's work to more competent critics.

With South Leicestershire my acquaintance is slight; the district I am familiar with is conveniently included in that portion of the county politically known as Loughborough or Mid-Leicestershire division. As this portion includes Charnwood Forest and the major portion of the Soar Valley, and also so much of the Trent Valley as lies in the north of the county, I think I am justified in saying that it includes all the prominent physical features to be found in Leicestershire.

It is to be regretted that Mr. Browne did not think it well to preface his remarks with a description of the general features of the country covered by his work. To do so now would occupy too much space, so I will content myself with the barest outline.

Leicestershire is an eminently agricultural county, and possesses but few areas of any great extent that remain in their virgin state. The most striking feature is the range of hills and woodlands known as Charnwood Forest; but, like many other so-called forests, the greater part is under cultivation.

At the present day Charnwood Forest consists of a hilly and well-wooded district lying in the north-west of Leicestershire, some ten miles in length by about six in breadth. The hills at Bardon and the Beacon reach the height of 850 feet and 700 feet respectively. The most prominent woods are—Buddon Wood, near Quorn, and the Out woods near Loughborough, whilst spinneys and woods of smaller areas are numerous. Lying within the area roughly known as the Forest are the deer-parks of Bradgate and Garendon, both of considerable extent, and containing fine old timber. In the smaller park of Beaumanor are to be found exceptionally fine oaks. The two sheets of water known as the Old Forest Reservoir, near Thringstone, and the reservoir for supplying the town of Loughborough with water, should not escape notice, though the latter locality is but poorly patronised by wildfowl.

The River Soar—a sluggish stream of no great volume, and to-day sadly polluted—takes its rise from the Warwickshire border, and, roughly speaking, flows through the centre of the county until it falls into the Trent at Redhill. The country in the Soar Valley is principally pastoral; arable land in the Loughborough neighbourhood, and down to the Notts boundary, being almost entirely absent. This is owing to the liability of the land to sudden floods, consequent on the increased drainage of the higher grounds. These floods are more prevalent in the spring than at other times. Along the course of the Soar are many flour-mills, most of them accompanied by a backwater and a weir: such spots are patronised to a certain extent by waterfowl, but the best cover is afforded by the numerous osier-beds lying along the whole course of the river.

Coal is worked at Whitwick and the immediate neighbourhood. Slates are quarried to a small extent on Charnwood Forest, whilst extensive granite quarries exist at Mountsorrel, Sheepshed, Markfield, and other places. Barrow-on-Soar possesses large lime-works. Otherwise the surface of the land is not much disturbed.

The rest of Leicestershire may roughly be said to be undulatory, many of the hills being crowned by small woods and copses. There are large woods at Belvoir and Belton, and smaller ones in other parts, such as Diseworth and Castle Donington; a well-timbered park runs down to the Trent at the latter locality. Sheets of water are few and far between, and mostly owe their origin to the exigencies of water supply for the neighbouring towns.

A glance at Mr. Browne's map will show the county boundaries, but I must call particular attention to that portion formed by the course of the Trent in the north of the county. It is well known that the Trent Valley is extensively used as a fly line by birds arriving on our east coast and journeying towards the Bristol Channel, and other haunts of wildfowl on our S.W. coasts. It is much to be regretted that Mr. Browne's notes are so sparse which relate to such species as the Dunlin, Redshank, Greenshank, Whimbrel, Curlew, Lapwing, Grey Plover, Ringed Plover, besides numerous Ducks, Gulls, and Terns which use this route, with great regularity.

It will no doubt strike the reader that Mr. Browne's book is largely compiled, as he states in his Preface, from the MSS. of the late James Harley, covering a period from 1840 to 1855. His other correspondents appear to reside either in the south of the county or in the east, so that for a period of thirty-five years he has no notes relating to the district with which I am most acquainted. Mr. Browne's own notes appear mainly to refer to the country immediately round Leicester, where his time must be largely taken up by the duties which occupy him as Curator to the Leicester Museum.

I think these facts, and also the fact of his contemplating a second edition of his work, will make my notes of sufficient interest to justify their publication.

Before criticising in detail the birds enumerated, I should like to call attention to Mr. Browne's treatment of two species, *viz.* the Wood Warbler, *Phylloscopus sibilatrix,* and the White Wagtail, *Motacilla alba.*

In the case of the Wood Warbler Mr. Browne's scepticism is something surprising in the face of Harley's notes and accurate description of the nest. There is not the slightest reason for doubting Lord Gainsborough's observation, and I do not see the necessity for shooting a bird when one is quite certain of its identity.* That Mr. Browne has not seen a Wood Warbler in the Midlands for twenty-five years proves nothing but his own lack of observation.

In the case of the White and Pied Wagtails he is even more original. I cannot conceive it possible that anyone, having any pretensions to ornithological knowledge, could mistake the "male" of *Motacilla Yarrelli* for that of *M. alba* at a season of the year when the difference is most marked. With reference to the validity of the two species, I cannot help thinking that Mr. Browne has got a series of skins incorrectly labelled, on which he has based his conclusions.

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* Yet Mr. Browne writes that the records "have been unsatisfactorily founded upon any other evidence than that of actual possession."

Missel Thrush, *Turdus viscivorus*.—The number of resident birds is largely increased by foreign arrivals during October. Formerly common, but its numbers were much reduced by the severe winters between 1875 and 1881. It seems to have now recovered its former status. I have taken unspotted eggs in the Soar Valley.

Redwing, *T. iliacus*.— Living near the Soar mouth during 1886-7, I noticed constant arrivals throughout October until the following January, mostly at night.

Ring Ouzel, *T. torquatus*.—I do not think this species now breeds in Charnwood Forest, or that it ever did in any numbers. The scarcity of the bilberry and other mountain fruits may to some extent account for its absence. It is curious that this species, breeding so freely as it does in Derbyshire, should so seldom occur in Leicestershire on migration. I think the explanation of the fact must be that it flies over at a great elevation.

Wheatear, *Saxicola œnanthe*.—I look upon its breeding in Leicestershire as quite exceptional. As it is scarce in the Peak of Derbyshire, I conclude we are out of its fly line. I see but a few each year on migration.

Whinchat, *Pratincola rubetra*.—I doubt its being double-brooded, from the fact of the parents being seen with the young in the hay-fields during the latter part of June. I have found the nest most frequently in mowing grass. It is very partial to fields alongside the railways. In the Soar Valley I found a nest situated in a small blackthorn bush standing in a nettle bed. I have frequently seen it hovering like a Kestrel before pouncing on some beetle or other insect, but I do not think it takes beetles on the wing.

Stonechat, *P. rubicola*. Very rare. I met with a single pair on Charnwood Forest amongst the gorse bushes. I think they had young in the neighbourhood.

Redstart, *Ruticilla phœnicurus*.—Breeds freely on Charnwood Forest, and in the neighbourhood of Loughborough. In the lower parts of the Soar Valley rather scarce.

Nightingale, *Daulias luscinia*.—More generally distributed than Mr. Browne imagines. Breeds regularly on Charnwood Forest, and also near Loughborough, and that portion of the eastern part of the county bordered by Notts.

Lesser Whitethroat, *Sylvia curruca*; **Blackcap**, *S. atrica-*

pilla; GARDEN WARBLER, *S. hortensis.*—These three species vary curiously in numbers from year to year. I have never known a season in which all the three species were equally common. With the exception of *S. curruca*, scarce in the lower Soar Valley. In the case of *S. hortensis* there seems to be an excess of males over females; some woods will resound with their song, but the female is not to be seen, neither is there any cover for the nest.

GOLDCREST, *Regulus cristatus.*—Far from uncommon, breeding in the Loughborough neighbourhood and on Charnwood Forest, but favours localities containing trees of the fir tribe. A pair bred in the grounds of the Loughborough Grammar School.

CHIFFCHAFF, *Phylloscopus rufus.*—Fifteen years ago this was a very common species, and I found many nests. A few still breed with us in North Leicestershire, and I met with young birds in September this year. In the 'Birds of Cumberland' will be found some notes on the extension northwards of the range of the Chiffchaff. There may be some connection in this and its partial disappearance from North Leicestershire. I once took the nest on a low branch of a spruce fir.

WOOD WARBLER, *Phylloscopus sibilatrix.*—Could I have anticipated Mr. Browne's notes on this species, I might have been able to place in his hands a nest and eggs, taken with a second one on Charnwood Forest last year; but as I possessed authentic eggs of the Wood Warbler, I only took a passing interest in them. I have known the Wood Warbler as a regular spring visitor, in small numbers, to certain woods on Charnwood Forest, for the last twenty years. I also meet with it in certain plantations in Notts, close to the Leicestershire border, most seasons. I have also observed it in Derbyshire. Writing from memory only, I think I heard it twelve years ago on a visit to the woods at Belvoir, but I do not insist on this latter locality. From its habit of frequenting the tops of trees, it is often more heard than seen; but there should be no difficulty in finding the bird, when guided by its song, if one only looks for it before the oak woods are in full leaf.

REED WARBLER, *Acrocephalus streperus.*—This species still breeds in the localities enumerated by Harley, though it certainly does not abound in any part of the lower Soar Valley. The most remarkable situation in which I have found the nest was in a willow tree, some 30 feet from the ground. The materials used in the construction of the nest mentioned by Mr. Browne are not commonly used.

Dipper, *Cinclus aquaticus*.—I fear extinct in Leicestershire as a breeding species. I know the brook mentioned by Mr. Browne but have never seen the Dipper there.

Long-tailed Tit, *Acredula caudata*.—I have always considered this a plentiful bird, more so in the better-wooded parts. I am surprised Mr. Browne did not meet with it for so long.

Coal Tit, *Parus ater*; Marsh Tit, *P. palustris*.—I agree that formerly the Marsh Tit was common. Several favourite breeding stumps I knew were quite riddled with old nest-holes. The Coal Tit, except in the autumn, is still scarce. I have only once found the nest. In 1881 and 1882 I found the Marsh Tit breeding commonly a few miles over the Leicestershire border, near Rugby.

Nuthatch, *Sitta cæsia*.—Rather scarce. I have heard it near Buddon Wood, but have never taken the nest.

White Wagtail, *Motacilla alba*.—On April 20th, this year, I had a male under observation for about half an hour. I was on Nottinghamshire ground, but, when a quarrelsome Pied Wagtail drove it away, it flew towards the Leicestershire border. I consider it a very uncommon bird in Leicestershire.

Pied Wagtail, *M. Yarrellii*. The first egg in a nest found at Cotes Abbey was a Cuckoo's. In a nest in Garendon Park were two Cuckoo's eggs.

Grey Wagtail, *M. melanope*.—I have observed this species near the Soar mouth as early as August, and have seen little flocks by the end of September. As this species breeds in Derbyshire, we might reasonably expect it to appear early in Leicestershire. As it is common on the Soar, I do not think it necessary to note each occasion on which I have seen it. A female seen April 2nd was just assuming the black throat.

Ray's Wagtail, *M. rayii*.—Nests also on the stumps in osier-beds. More common in the Trent than in the Soar Valley. I met with several this year on April 6th.

Meadow Pipit, *Anthus pratensis*.—I cannot consider this a common breeding species. I have only once known the nest to be found in the Lower Soar Valley, the tussocky meadows which it prefers being absent. It breeds in Notts near the Soar mouth, and probably does so in the Leicestershire portion of the Trent

Tree Pipit, *A. trivialis*.—Abundant on Charnwood Forest, and also near Loughborough. Scarcer lower down the Soar Valley.

Red-backed Shrike, *Lanius collurio*.—Decidedly rare. I have only seen the bird once or twice, but have five eggs taken near Loughborough.

Pied Flycatcher, *Muscicapa atricapilla*.—The only occasion on which I have seen this bird was in the case of a pair which nested in a hole in Coates Bridge, about the year 1874. I observed the birds whilst fishing. I had the eggs in my possession for several years.

Sand Martin, *Cotyle riparia*.—Nowhere so numerous as in the Leicestershire portion of the Trent Valley. In the cold spring of 1886 large numbers perished soon after their arrival. I saw a white specimen on August Bank Holiday, last year.

Goldfinch, *Carduelis elegans*.—Rare as a breeding species; more often found in the Vale of Belvoir. A few flights of young birds visit the Soar Valley in the autumn.

Hawfinch, *Coccothraustes vulgaris*.—Mr. Browne remarks, "Breeding occasionally." In the Loughborough district five nests were found this year in one small wood. I have found the nest in several parts of the Soar Valley. The tenant of an allotment garden at Loughborough complained of the havoc the young Hawfinches had made with his peas last year.

Tree Sparrow, *Passer montanus*.—Partially migratory, and breeding more freely amongst the pollard willows of the lower grounds than on Charnwood Forest. Plentiful in 1889.

Chaffinch, *Fringilla cælebs*.—I suspect the Chaffinches "flocking in thousands," as noted by Mr. Ingram in the Vale of Belvoir, to have been foreign birds. I observed them in October, 1889, arriving in large numbers on the shores of the Wash.

Brambling, *Fringilla montifringilla*.—I met with a flock in the early spring of 1874, I think. They were busily searching the branches of some fir trees.

Lesser Redpoll, *Linota rufescens*.—I have frequently found the nests in hedgerows in the Soar Valley. This bird was numerous at Christmas, 1886.

Mealy Redpoll, *L. linaria*.—Mr. O. V. Aplin informs me that he has in his possession the skin of a male, which he received from a dealer labelled "Loughborough, 3 October, 1882."

But he justly remarks that the date seems unusually early, and that the fact must not, of course, be taken as affording undoubted proof of the occurrence of the species in Leicestershire. This Redpoll is not included in Mr. Browne's book.

Twite, *L. flavirostris.*—A scarce Leicestershire bird; perhaps more frequent in the Trent Valley than in other parts of the county. A few were taken in September, this year, by bird-catchers near the Soar mouth.

Corn Bunting, *Emberiza rustica.*—Common in the Soar Valley; nowhere more so than in the Great Meadow at Loughborough. In spite of its being a resident bird, I look upon it as a late breeder.

Starling, *Sturnus vulgaris.*—Large numbers of foreign immigrants arrive, *viâ* the Trent Valley, about the same time as the Fieldfares.

Magpie, *Pica rustica.*—In North Leicestershire getting scarce. I have frequently found nests in hedgerows nearly within reach, but only when the leaves were fully out. I was particularly struck by the number of Magpie's nests to be seen from the Midland Railway when travelling from Leicester to Rugby in 1881.

Hooded Crow, *Corvus cornix.*—Common. Arrives in small flocks in the Trent Valley during October. Frequents the margin of the river, where it feeds on dead fish and other river-side delicacies.

Rook, *C. frugilegus.*—Abundant. Few villages exist which do not possess a rookery, some of them of ancient establishment. There are two large rookeries near the centre of Loughborough.

Jackdaw, *C. monedula.*—Abundant in the well-timbered parks. The obelisk in Garendon is supported on its pedestal by four stone balls; in the space underneath is a Jackdaw's nest.

Sky Lark, *Alauda arvensis.*—Large numbers of foreign-bred birds reach Leicestershire *viâ* the Trent Valley in the autumn.

Wood Lark, *A. arborea.*—I am assured that the Wood Lark breeds near Loughborough, and have had eggs brought to me referred to this species, but the evidence is not conclusive, to my thinking.

Swift, *Cypselus apus.*—A large colony existed in the town of Loughborough, near Bedford Square, and on a summer evening parties of six or seven could be seen careering along just over the heads of passengers in the streets, filling the air with their shrill screams. It also bred abundantly, and may do so still, at Morpilers, where James Harley lived.

Wryneck, *Jynx torquilla.*—Rare in the northern portion of the county. I have not known the nest to be found.

Hoopoe, *Upupa epops.*—A pair occurred at Loughborough at the end of April, 1885, as recorded by me in 'The Naturalist,' No. 128.

Barn Owl, *Strix flammea.*—I have frequently seen this species when sugaring for moths, and once observed it flying in the daytime near Cotes Abbey.

Long-eared Owl, *Asio otus;* **Short-eared Owl**, *A. brachyotus.*—I always considered the former bird to be the most common, but I have not often met with either species.

Tawny Owl, *Strix aluco.*—The commonest of the Owls; the old timber in the parks, and pollard willows of the Soar Valley, affording numerous nesting sites.

Peregrine, *Falco peregrinus.*—I have twice seen this species near the Soar mouth, but never in the breeding season.

Merlin, *F. æsalon.*—Has been reported to have bred on Pocketgate Rocks; the eggs were taken, and resembled Merlin's, but of course this is not conclusive evidence.

Osprey, *Pandion haliaëtus.*—Has recently occurred on the Trent near Donington Park.

Heron, *Ardea cinerea.*—Nests sparingly near Long Whatton, and also near Castle Donington. In August, this year, I observed five Herons rise from a drain flowing into the Soar near Loughborough.

Bittern, *Botaurus stellaris.*—As this species occurs every winter in the Trent Valley, I have no doubt it is occasionally found near the Soar mouth. I examined a fine specimen caught near Long Eaton, but whether on Leicestershire ground or not I cannot say.

Canada Goose, *Bernicla canadensis.*—The Garendon flock has existed for many years, and I have frequently seen them miles away from home.

Ducks.—Several species of migratory Ducks are to be found passing up the Trent Valley in the autumn, consequently they fly over the northern portion of the county. Amongst those I have seen or known to be shot are odd specimens of Common Sheldrake (*Tadorna cornuta*), Long-tail (*Harelda glacialis*), Goldeneye (*Clangula glaucion*), Common Scoter (*Œdemia nigra*), Goosander (*Mergus merganser*), Smew (*M. albellus*), and more frequently Wigeon (*Mareca penelope*), Teal (*Anas crecca*), Tufted Duck (*A. cristatus*), Shoveller (*A. clypeata*), and Wild Duck (*A. boscas*). This last-named species breeds, and I believe that the Teal, Tufted Duck, and Shoveller also occasionally do so.

STOCK DOVE, *Columba œnas.*—I have found this species breeding in Garendon Park, and also in several localities in the lower Soar Valley. It breeds in the red cliffs overlooking the Trent in various parts of its course in Nottinghamshire.

RED-LEGGED PARTRIDGE, *Caccabis rufa.*—Not uncommon near Loughborough and about Ratcliffe-on-Soar.

QUAIL, *Coturnis communis.*—I heard the notes of this species in the spring of 1882 near Loughborough. A specimen was killed by the telegraph-wires in May, this year, within a short distance of the county border.

WATER RAIL, *Rallus aquaticus.*—Inhabits most of the osier-beds, but without the aid of dogs is very difficult to find. I saw an egg taken near Loughborough.

SPOTTED CRAKE, *Porzana maruetta.*—Would probably breed every year were it not for the spring floods. Later broods may get off, which may account for young birds being met with late in October. I killed one on the 25th, this year, near Barrow-on-Soar.

CORN CRAKE, *Crex pratensis.*—Numerous in the mowing fields of the Soar Valley, especially so in the Great Meadow at Loughborough. Ranges up to the foot of Charnwood Hills.

COOT, *Fulica atra.*—Breeds at Garendon. Scarce on the Soar and on the Trent.

Before commenting on the *Limicolæ* mentioned in Mr. Browne's book, I must state that the direction of migration in the case of the Redshank, Dunlin, and Ring Plover is westerly, and not to the north-east, as might be imagined. I must also state that I have not always been standing on Leicestershire ground when making my observations, though not often at a greater distance than a mile from the county border, and as birds persistently follow the same course year after year, it merely requires a change of position on my part to actually note the fact on Leicestershire ground. On arriving at the Soar mouth birds appear to leave the course of the Trent, and to fly in a more south-westerly direction, which carries them fairly over the county.

GOLDEN PLOVER, *Charadrius pluvialis.*—Occasional small flocks in the autumn and winter, but more often odd birds, in company with Lapwings. I have not seen black-breasted birds in Leicestershire, though they occasionally occur in Notts, on the immediate border.

GREY PLOVER, *C. helvetica.*—On Nov. 11th, 1888, I saw a flock of about a score, and occasionally recognised odd birds at a great elevation by their cries.

RINGED PLOVER, *Ægialitis hiaticula.*—Occurs in small numbers on migration in spring and autumn. I have met with it as early as April 21st, and as late as May 26th; in the latter case probably non-breeding birds. I have seen the young by the 20th July, and throughout August I have recognised their notes as they flew over at night.

LAPWING, *Vanellus vulgaris.*—Common as a breeding species in the lowlands, but almost absent at that season from Charnwood. Immense numbers sometimes arrive during November from more northern regions *viâ* the Trent Valley.

WOODCOCK, *Scolopax rusticola.*—Breeds sparingly on Charnwood. I have four eggs from that locaiity.

DUNLIN, *Tringa alpina.*—In spite of what Mr. Browne says to the contrary, this species is met with in breeding plumage with great regularity every spring. The direction of their journey is westward, as far as I have been able to trace them, but I have yet to learn their ultimate destination. On their spring journey they appear about the third week in April, in little parties of six or seven odd birds, a little earlier, and occasionally a late bird will be met with at the beginning of June. I have seen young with traces of down about the nape as early as July 20th. In the winter, as a rule, only odd birds occur, but on Nov. 9th, 1890, I saw a flock of eleven flying in a S.W. direction.

COMMON SANDPIPER, *Actitis hypoleucus.*—Another common visitor on migration to the Trent and Soar Valleys, occasionally remaining to breed. Odd birds may be seen by the Trent all through the summer; but usually they are absent from the middle of May till the first week in July, when young birds may be found with their parents. It is far more common on the Trent than on the Soar. A pair bred for several years near

Cotes Abbey, and in May, 1886, the nest was found, but not disturbed.

GREEN SANDPIPER, *T. ochropus.*—A scarce visitor to the Trent and Soar Valleys, and most often met with in August. It is occasionally, however, to be seen in the winter. On Feb. 14th, 1886, a pair flew in front of my boat on the Soar at Redhill.

COMMON REDSHANK, *Totanus calidris.*—This species is not mentioned by Mr. Browne, and as a few pairs breed annually between Redhill and Castle Donington, it is a pity he was not aware of the fact. I have met with them as early as March 15th, but I consider the beginning of April to be the usual time of their arrival.

GREENSHANK, *T. canescens.*—One of those species that occurs sparingly in the Trent Valley during migration. Several have been shot this year, but I am not aware of any actually killed in Leicestershire.

WHIMBREL, *Numenius phæopus.*—Passes on migration in small numbers with great regularity. I observed a flock near the Soar mouth on May 9th, 1889.

CURLEW, *N. arquatus.*—Like the last, a passing migrant, usually flies at a greater elevation. I saw an odd bird at the Soar mouth during severe weather in the winter of 1886-7. I can hardly credit Harley's statement, that this species was numerous on Charnwood Forest. The ground is far too dry, and, considering its scarcity on such ground as the Derbyshire Peak, I think Harley must have unwittingly exaggerated its numbers. A pair passed me near the Soar mouth on June 22nd, this year—a most unusual date.

ARCTIC TERN, *Sterna macrura;* COMMON TERN, *S. fluviatilis.*—Seen on migration some years in fair numbers, but I have never shot any of them, so cannot say for certain that both species occur.

SANDWICH TERN, *S. cantiaca.*—On May 14th, 1888, a single bird of this species was hawking up and down the Trent between Redhill and Barton Ferry. It passed close to me several times, so I had no difficulty in recognising it.

BLACK TERN, *S. nigra.*—Only met with in the spring, generally at the end of May or beginning of June, and only in small numbers. Long continued east winds in spring never fail to bring the Black Terns.

GULLS.—The Black-headed Gull, *Larus ridibundus*, is common in spring, and has been reported to have bred near Donington Park, but not, I think, on sufficient evidence. Most of the specimens I have examined showed signs of immaturity, and occurred at almost every time of the year. The Common Gull, *L. canus*, passes regularly on spring migration, and also occurs after storms with the Lesser Black-backed and Herring Gulls, and the Kittiwake, *L. tridactylus*. The two larger species are generally represented by immature birds.

GREAT CRESTED GREBE, *Podicipes major*.—Reported to breed at Dishley. An adult in winter plumage was killed at Zouch, October 13th, and a second bird, a little later, at the Soar mouth.

LITTLE GREBE, *P. minor*.—Breeds on the Soar, but only sparingly, and also at Dishley. I found this species very common about Normanton in October, 1889.

Mr. Browne concludes his remarks on the Birds of Leicestershire with a table headed "Dates of arrival of Summer Migrants in Leicestershire," which is divided into two periods. Taking the later period, I find extraordinary variation in the dates given. The table should evidently be headed, "Dates of *first noting* the arrival of Summer Migrants."

As will be seen by the text, the foregoing remarks refer to the district mentioned in the first part of my paper.

NOTES AND QUERIES.

Death of Mr. Thomas Cornish, of Penzance.—We have only recently heard, with regret, of the death of Mr. Thomas Cornish, of Penzance, which took place on the 12th of August last, at the age of sixty-one. Mr. Cornish, who was for many years a contributor to 'The Zoologist,' was born at Tavistock in July, 1830, and educated at the Bedford Grammar School in that town, and afterwards at Blundell's, Tiverton. Adopting the law as his profession, he went to Penzance in 1858, where he joined the firm of Messrs. Rodd and Darke, and, on the death of Mr. Darke, became Mr. Rodd's partner. The name of Edward Hearle Rodd, who died in January, 1880 (*cf.* Zool. 1880, p. 113), was well known in connection with the 'Birds of Cornwall,' and Thomas Cornish seems to have paid almost as much attention to the Marine Fishes and Crustacea of the county. His chief contribution to the literature of this subject appeared in the new edition of Couch's 'Cornish Fauna,' which appeared in 1878. In this volume the information on Vertebrate Animals was brought up to date by different specialists; the Mammals being undertaken by Mr. Brooking Rowe, the Birds by Rodd, and the Reptiles and Fishes by Cornish. Since that date (1878) Mr. Cornish lost no opportunity of supplementing that publication by additional notes on various species which he communicated from time to time to this Journal, and which will be fresh in the recollection of many. As a useful corrrespondent in the west of England, he will be much missed by our readers.

MAMMALIA.

Alleged Antipathy of Cattle to Deer.—With reference to the doubt expressed in the last number of 'The Zoologist' (1890, p. 453) as to the statement on this subject, contained in the 'British Association Report, 1887,' on the Wild Cattle, may I, as the compiler of that Report, give the following explanation of the passage? Various members of the Committee contributed notes on one or other of the herds, and amongst these were some interesting items concerning the Chillingham herd, sent by Canon Tristram, *written on the spot*, which may be considered as sufficient guarantee of authenticity. In these notes the following passage occurs:—"Some Red-deer have been introduced, which associate and feed with the cattle on the most friendly terms. But they never will tolerate Fallow-deer or sheep in the park, probably because they eat the pasture too close, or they did not remember them as inhabitants in the palæolithic ages." The last part of the sentence was of course written in joke; but if I had been writing for myself only I should have omitted the whole passage, as I am unable to agree with it, having visited all the herds (except the two domesticated herds in Norfolk); and Chillingham I have visited on two separate occasions, sleeping each time in the immediate neighbourhood, so as not to be limited to a flying visit. Being, however, the mouthpiece of the Committee, I did not consider myself at liberty to omit the passage altogether, especially as the statement was made by so distinguished a naturalist as Canon Tristram. I did, however, modify it so far as I felt justified in doing. The statement that the Red-deer "have been introduced" was also a surprise to me. Perhaps, while I am on the subject of this Report, I may mention one other point. It will be noticed by anyone having a copy of the Report, as published by the British Association, that there are four short paragraphs at the beginning, which are omitted in 'The Zoologist' edition. These touch upon the probable origin of the herds of park cattle; the probability (judging from such shreds of evidence as can be scraped together) seeming to me entirely in favour of these herds not being descended directly from the huge Wild Urus, but rather from domesticated animals, or possibly *feral* cattle. Canon Tristram, however, being possibly of a more sanguine temperament than I am, believes the contrary; and my original MS., as read from by Canon Tristram at the Manchester meeting, was slightly modified by me before being published. 'The Zoologist' edition was printed while these paragraphs were still under discussion, and the Editor thought the simplest plan was to omit them altogether, especially as the question under discussion was quite apart from the subject on which the Committee was asked to report.—ALFRED HENEAGE COCKS (Great Marlow, Bucks).

BIRDS.

Bonaparte's Gull in Cornwall.—I lately received from Mr. T. H. Cornish, of Penzance, for identification, an immature specimen, in the last year's plumage, of a small Gull which was shot at Newlyn, near Penzance, on the 24th October last. Its diminutive size, slender bill, and characteristic markings on the webs of the primaries, showed it to be Bonaparte's Gull, *Larus philadelphia*, Ord.—*Larus Bonapartii*, Swains. & Rich. This North American species, which in autumn goes southward to California on the west, and North Carolina on the east, has been found at the Bermudas, and on several previous occasions has occurred as a wanderer to the British Islands. It must nevertheless be regarded as one of the rarest visitors amongst the *Laridæ*. Before returning the specimen I took the opportunity of exhibiting it at a meeting of the Linnean Society on the 4th of December.—J. E. HARTING.

FISHES.

Ray's Bream near Penzance.—It may interest some of the readers of 'The Zoologist' to know that, on November 13th, a specimen of Ray's Bream, *Brama rayi*, was caught with hook and line in Mount's Bay. I saw it while still fresh. Although not particularly uncommon, I never before heard of one being caught with hook and line. They are generally thrown ashore after heavy gales.—T. H. CORNISH (Penzance).

MOLLUSCA.

A new Locality for Geomalacus maculosus, Allman.—While following the road between Kenmare and Glengariff, last August, I came across two specimens of this rare and curious slug. They were within a few yards of each other on the damp grassy roadside, about nine miles from Kenmare and a mile from the Tunnel over which runs the boundary between Cork and Kerry. Caragh Lake, where Mr. Andrews first found *Geomalacus maculosus* in 1842, had hitherto remained its only known habitat, and the chief interest, therefore, of this new Kerry locality lies in the wide extent of country over which this slug may be expected to range; for while the two localities are more than twenty miles apart in a straight line, Caragh Lake is about 60 feet above sea-level, and the new locality between 600 and 700 ft. Being within a mile or so of the county Cork boundary it also points to the probable extension of its range to this latter county.—Reginald W. Scully (91, Lower Baggot Street, Dublin).

SCIENTIFIC SOCIETIES.

Linnean Society of London.

Nov. 20, 1890.—Prof. Stewart, President, in the chair.

Mr. J. F. Braga and Rev. E. M'Clure were elected Fellows.

Mr. G. Murray exhibited specimens of a fresh-water *Delesseria*, previously unknown.

On behalf of Mr. Henry Hutton, of Cape Town, Mr. B. D. Jackson exhibited some follicles and seeds of a somewhat rare Asclepiad, *Dregia floribunda;* and showed also, on behalf of Mr. W. Matchwick, some ripened seeds of *Ailanthus glandulosa*, from a tree at Reigate, said to be a hundred years old.

Prof. Bower exhibited several drawings from microscopic sections of carboniferous nodules belonging to Prof. Williamson, and pointed out the peculiarities of structure. Microscopic details of such sporangia being very rare, he remarked that a comparison of the slides showed a peculiar uniformity of type. For a comparison of these sporangia from the coal he exhibited sections of the sporangia of *Todea barbara*, and while not going so far as to refer these carboniferous sporangia (which are not attached to the plants which bore them) to any distinct genus, he thought the Osmundaceous affinity was unmistakeable.

Mr. J. E. Harting exhibited some original MSS. and water-colour sketches of birds, fishes, and plants found in Sussex by William Markwick, the friend and correspondent of Gilbert White, of Selborne, which had been presented by him to the Society in his lifetime, and had been lost sight of for many years. The drawings are sufficiently well executed to enable the correct determination of several species which the author had failed to identify.

A paper was then read by Prof. T. Johnson (Dublin) on the systematic position and affinities of *Punctaria*, a genus of brown sea-weeds ((*Phæophyceæ*) founded in 1830 by Greville. The paper was illustrated by explanatory diagrams, and a discussion followed in which Messrs. D. H. Scott, E. M. Holmes, and G. Murray took part.

Mr. Vaughan Jennings gave an abstract of a paper on a variety of sponge, *Alectona Millari*, Carter, boring in the shell of *Lima excavata*, from the Norwegian coast. The sponge had endeavoured to grow inwards, dissolving the nacreous layer and encroaching on the mollusc instead of restricting its wanderings to the thickness of the shell. The mollusc had retaliated by depositing fresh layers on the intruder, and the struggle had gone on until the chambers were several times the normal thickness of the shell, and were roofed over by a thin curved layer of secondary shell-substance, while the points at which branches had been pushed further in were represented by thick conical papillæ.

December 4.—Prof. STEWART, President, in the chair.

Mr. John Watson was admitted a Fellow of the Society; and the following were elected:—Messrs. A. Barclay, W. Brown, W. A. Clarke, W. Gill, C. M'Rae, W. H. Miskin, R. Bentley, H. Williams, and H. G. Plummer.

The President exhibited some eggs of the Shell-slug, *Testacella haliotidea*, and briefly described the habits and mode of feeding in this mollusk. He also delineated and described the feeding tract of the snail.

Mr. F. G. George exhibited an autumnal flowering form of *Mercurialis perennis*, with stems four feet in length, which he had found at Preston, Lancashire.

Mr. R. A. Rolfe exhibited and made some remarks on a coloured drawing of *Cycnoches rossianum*, showing both male and female inflorescences on the same pseudo-bulb.

Mr. J. E. Harting exhibited an immature example of Bonaparte's Gull, *Larus philadelphia*, Ord., of North America, which had been shot on the Cornish coast at Newlyn, on the 24th October last.

Mr. T. Christy exhibited and made remarks on some Coca-leaves which had been forwarded from an East Indian plantation, and which were found to be superior to any received from South America.

On behalf of Mr. H. N. Ridley, of the Botanic Gardens at Singapore, Mr. B. D. Jackson read a paper on Orchids, genus *Bromheadia*, on which some critical remarks were offered by Mr. R. A. Rolfe.

The next paper was one by Messrs. J. H. Lace and W. B. Hemsley, on the Vegetation of British Beluchistan, illustrated by a route-map showing the district in which Mr. Lace had been collecting. Seven hundred species were catalogued, amongst which were eleven new to science. The paper was ably criticised by Mr. C. B. Clarke, and Mr. J. G. Baker made some interesting observations on the peculiar prickly character of the vegetation which predominates in the hot and dry district explored.

ZOOLOGICAL SOCIETY OF LONDON.

Nov. 18, 1890.—Dr. MIVART, F.R.S., in the chair.

Mr. F. Mentieth Ogilvie exhibited and made remarks on a specimen of the Red-headed Flycatcher obtained in Norfolk.

Prof. F. Jeffrey Bell exhibited an example of the Cotton-spinner, *Holothuria nigra*, taken off the west coast of Ireland, and sent for determination by Prof. Herdman.

Mr. G. A. Boulenger exhibited a series of skulls belonging to *Distira cyanocincta* and *Chelone midas*.

Mr. G. A. Boulenger read a paper upon the Reptiles and Batrachians of Barbary (Morocco, Algeria, Tunisia), based chiefly upon the notes and collections made in 1880–84 by M. Fernand Lataste. A second paper by Mr. Boulenger contained remarks on the Chinese Alligator.

A communication was read from the Rev. O. P. Cambridge, giving an account of some new species and two new genera of *Araneidea*, mostly collected in South Africa by the Rev. Nendick Abraham.

Mr. Smith Woodward read a paper on some Upper Cretaceous Fishes of the family *Aspidorhynchidæ*. He offered a detailed description of *Belonostomus comptoni*, from Brazil, and defined a new genus (*Apateopholis*) from Syria. The latter is remarkable as being the only physostomous fish hitherto described exhibiting a spinous armature of the preoperculum.

Mr. G. C. Champion read a paper on the Heteromerous Coleoptera collected by Mr. Bonny at the Yambuya Camp, Aruwimi Valley.

December 2.—Prof. W. H. Flower, C.B., LL.D., F.R.S., President, in the chair.

The Secretary read a report on the additions that had been made to the Society's Menagerie during November, and called special attention to the acquisition of a specimen of the Cryptoprocta, *Cryptoprocta ferox*, of Madagascar.

A letter was read from Mr. A. Milne-Edwards, containing an account of the mode in which the typical specimen of Grévy's Zebra had been mounted for the Gallery of the Museum, and pointing out that the mounted specimen has been carefully modelled after the living animal.

A letter was read from Dr. Emin Pasha, dated "Tabora, East Africa, August 16th, 1890," containing an expression of his thanks for having been elected a Corresponding Member; and giving some remarks on the Striped Hyena of that district.

Mr. Richard Crawshay read a paper on the Antelopes of Nyassaland, treating especially of those to be met with west of the Lake. Lichtenstein's Hartebeest was stated to be very generally distributed, and seven other Antelopes to be plentiful. The Kudu, Sable Antelope, and Black-tailed Gnu were seldom met with; but exact localities were given where these Antelopes were to be found. In conclusion, the author added that there are at least two other species of small Antelopes found in the hills, which hitherto he had not been able to identify.

Prof. G. B. Howes read a paper on the peculiar mode of the suspension of the viscera in the Australian Batoid fish, *Hypnos subnigrum*. A second communication from Prof. Howes contained notes on the pectoral fin-skeleton of the Batoidea and of the extinct genus *Squaloraia*, which he maintained must be referred to the Chimæroid group.

Mr. G. A. Boulenger read a paper on the presence of pterygoid teeth in a tail-less Batrachian, *Pelobates cultripes*, and added remarks on the localisation of the teeth on the palate in the Batrachians and Reptiles.

Mr. H. Seebohm read a paper on the Fijian birds of the genus *Merula*, and gave a description of a new species from Viti-Levu, which he proposed to call *Merula layardi*.—P. L. SCLATER, *Secretary*.

ENTOMOLOGICAL SOCIETY OF LONDON.

December 3, 1890.—The Rt. Hon. Lord WALSINGHAM, M.A., F.R.S., President, in the chair.

Mr. John Gardner, of 6, Friar Terrace, Hartlepool; and Mr. Samuel James Capper, F.L.S., of Huyton Park, near Liverpool, were elected Fellows of the Society.

Dr. D. Sharp exhibited specimens of *Papilio polites*, *P. erithonius*, and *Euplœa asela*, received from Mr. J. J. Lister, who had caught them on board ship when near Colombo, in November, 1888. Dr. Sharp read a letter from Mr. Lister, in which it was stated that from the ship hundreds of these butterflies were seen flying out to sea against a slight breeze. Many of them, apparently exhausted by a long flight, alighted on the deck of the ship, and large numbers perished in the sea.

Lord Walsingham exhibited a coloured drawing of a variety of *Acherontia atropos*, which had been sent to him by Mons. Henri de la Cuisine, of Dijon. He also exhibited specimens of an entomogenous fungus, apparently belonging to the genus *Torrubia*, growing on pupæ, received from Sir Charles Forbes, and which had been collected in Mexico by Mr. H. B. James. Mr. M'Lachlan expressed an opinion, in which Mr. C. O. Waterhouse and Mr. G. C. Champion concurred, that the pupæ were those of a species of *Cicada*. Mr. F. D. Godman said that at the meeting of the Society on the 3rd October, 1888, he had exhibited a larva of a *Cicada* with a similar fungoid growth. The specimen was subsequently produced, and the fungus proved to be identical with that on the pupæ shown by Lord Walsingham.

Mr. R. Adkin exhibited male specimens of *Spilosoma mendica*, Clk., bred from ova obtained from a female of the Irish form which had been impregnated by a male of the English form. These specimens were of a dusky white colour, and were intermediate between the English and Irish forms.

Mr. F. Merrifield showed samples of a material known as "cork-carpet," and explained its advantages as a lining for cabinets and store-boxes. Dr. Sharp fully endorsed the opinion expressed by Mr. Merrifield.

Mr. R. W. Lloyd exhibited specimens of *Anisotoma Triepkei*, Schmidt, and *Megacronus inclinans*, Er., collected last August at Loch Alvie by Aviemore.

Mr. Merrifield read a paper entitled, "On the conspicuous changes in the markings and colouring of Lepidoptera caused by subjecting the pupæ to different temperature conditions," in which it was stated that the results of many experiments made on *Selenia illustraria* and *Ennomos autumnaria* tended to prove that both the markings and colouring of the moth were materially affected by the temperature to which the pupa was exposed: the markings by long continued exposure before the last active changes; the colouring, chiefly by exposure during these last changes, but before the colouring of the perfect insect began to be visible, a moderately low temperature during this period causing darkness, a high one producing the opposite effect, and two or three days at the right time appearing in some cases sufficient. Dryness or moisture applied during the whole pupal period had little or no effect on either markings or colouring. Applying the facts thus ascertained, Mr. Merrifield said he had obtained from summer pupæ of *illustraria* some moths with summer colouring and spring markings, some with spring markings and spring colouring, and some with summer markings, but an approach to spring colouring. These specimens, with enlarged and coloured photographs of them, were exhibited.

Mr. C. Fenn, who said he did not agree with Mr. Merrifield's conclusions, exhibited a very long and varied series of specimens of *Ennomos autumnaria*, all of which, he stated, had been bred at the same temperature. He expressed an opinion that the presence or absence of moisture, rather than differences of temperature, was one of the principal causes of variation. The discussion was continued by Lord Walsingham, Colonel Swinhoe, Mr. Waterhouse, Mr. Jenner Weir, Captain Elwes, Mr. M'Lachlan, Mr. Porritt, Dr. Mason, Mr. Barrett, and others.

Mr. G. T. Baker read a paper entitled "Notes on the Lepidoptera collected in Madeira by the late T. Vernon Wollaston." The paper was illustrated by a number of figures drawn and coloured some years ago by Prof. Westwood.

Mr. Hamilton H. Druce exhibited several very beautiful species of butterflies, belonging to the genus *Hypochrysops* from the Solomon Islands and Australia, and read a paper on the subject, entitled "A Monograph of the Lycænoid genus *Hypochrysops*, with descriptions of new species."

Mr. C. J. Gahan read "Notes on some species of *Diabrotica*."—H. Goss & W. W. Fowler, *Hon. Secretaries.*

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